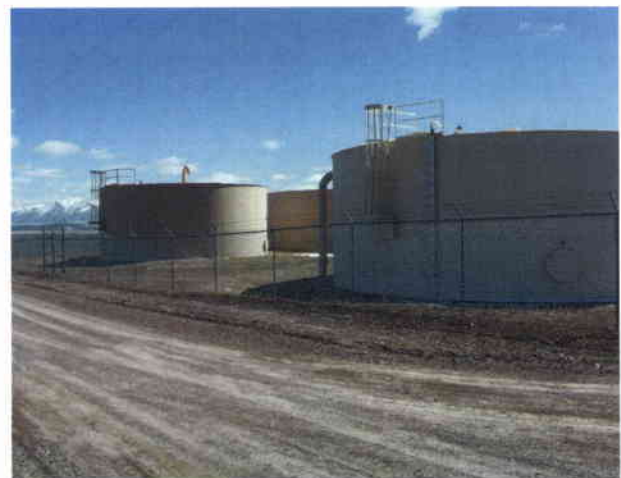
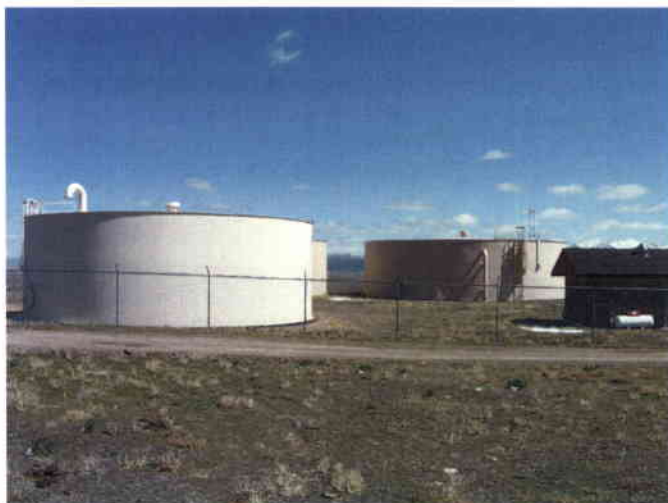


Eureka County

Joint Water Conservation Plan for Town of Eureka Water System Devil's Gate GID District #1 and District #2 Crescent Valley Town Water System



Eureka County
Joint Water Conservation Plan for
Town of Eureka Water System
Devil's Gate GID District #1 and District # 2
Crescent Valley Town Water System

Summary

Eureka County Public Works (ECPW) is dedicated to promoting water conservation through public outreach, customer education and responsible stewardship. ECPW recognizes the benefits of wise water use including:

- Cost savings - Minimizing the amount of water pumped, stored, and distributed saves ECPW and its customers money in reduced operating costs.
- Wastewater treatment benefits – Reduction of interior water use cuts wastewater loads on sewer treatment facilities and customer septic tanks, resulting in reduced treatment costs and lessened environmental impact
- Environmental benefits – Water removed from an aquifer for human consumption could be conserved for other purposes and future use.
- Water supply limitations – Water conservation can help stretch existing groundwater resources
- Energy savings – Reducing water production will save energy and reduce greenhouse gas emissions
- Minimizing the need for water system improvements – Water system expansion or capital improvements projects may be delayed, or the scope of the projects reduced, through water conservation measures
- Regulatory compliance – Nevada Revised Statutes (NRS 540.121 through 540.151) require “suppliers of water” to adopt a water conservation plan
- Customer benefits – Customers who conserve water may enjoy lower water bills and possibly lower wastewater and energy bills

Water systems

Eureka County Public Works (ECPW) manages and maintains three water systems, the Town of Eureka, Devils Gate (District #1 and #2), and Crescent Valley. The Town of Eureka system serves 275 customers, both residential and commercial. The Devil's Gate system serves 56 residential and commercial customers in Diamond Valley. Crescent Valley Town Water serves 280 residential and commercial customers.

The Town of Eureka system is gravity fed by a series of storage tanks. The Town's water source currently includes two wells in Diamond Valley and springs south of town. Water supplied by the wells is pumped into two storage tanks, located on opposite sides of town, with a combined storage capacity of 1.1 million gallons.

Devil's Gate is a residential area located in Diamond Valley, approximately 8 miles from the Town of Eureka, situated north and south of Highway 50. The water system consists of three main wells and one back up well, a water storage tank and booster pump station to pressurize the delivery system.

The Town of Crescent Valley is located 135 miles north of the Town of Eureka, 20 miles south of Interstate 80. The Crescent Valley water is supplied from two main wells with back-up generators. Three tanks store a total of 660,000 gallons of water to supply the gravity-fed system.

Water Conservation Plan Elements

Methods of public education (NRS 540.141 1. (a) (1) and (2))

This water conservation plan will be provided to customers of the Eureka County water systems in an effort to increase public awareness of the limited supply of water in this state and the need to conserve water. The information and educational resources contained herein are intended to give system customers the basic tools to evaluate and improve interior and exterior water use practices. Guidance for determining appropriate lawn watering schedules, checking for household leaks, and estimating how much water can be saved by installing water efficient residential plumbing fixtures is provided in the Appendix. In addition ECPW provides customers with water conservation information in their bills, and a periodic newsletter to provide seasonal water conservation information and to promote effective communication with customers.

ECPW also encourages customers to choose landscape design and planting that promote water conservation, and to redesign existing landscaping to reduce the size of lawn areas and encourage the use of plants that are adapted to arid and semiarid climates.

New construction landscapes and irrigation systems should be designed in accordance with the seven principles of water efficient (xeriscape) landscaping.

- Proper planning and design for local climates
- Soils analysis
- Appropriate plant selection
- Practical turf areas
- Efficient irrigation
- Use of mulches
- Appropriate maintenance

See "The seven principles of xeriscaping" in the Appendix. Information about evapotranspiration rates for Eureka County is included along with a lawn care guide for northern Nevada, and other helpful information related to use of water outdoors.

Specific conservation measures (NRS 540.141 (b))

Each water system is metered. The pump meters are read daily in order to monitor excessive water use and take immediate action. Also by integrating water infrastructure needs into the capital improvement plan, and allocating funds to address the needs, the County works continuously to improve the efficiency of transmission.

Management of water (NRS 540.141 (c))

In an effort to promote water conservation and reduce water waste within these water systems, ECPW has programs in place to identify and reduce system leakage, inaccuracies in water meters and to monitor distribution system pressures. Public Works acts immediately to repair leaks as soon as they are identified. They replace old water mains, service lines as funding is available. Defective meters are replaced immediately. Water operators check each system twice a day, every day, 365 days per year. Defective equipment, when identified, is immediately replaced. Well water levels are measured monthly. Telemetry assists the water operators to monitor tank levels and pump operation.

Drought Contingency Plan (NRS 540.141 (d))

The following contingency plan in the event of drought conditions will help assure the adequate supply of potable water. This plan specifies four stages of water conservation measures to be implemented based on the severity of the need to conserve.

Stage One

During normal water system operating conditions, i.e., no drought, customers should observe every day, “common sense” water conservation measures to help keep customer bills low and reduce the burden on the water systems. Each water system has its own ordinance. The three systems require all residential and commercial customers have a water shutoff valve installed between the water meter and the residence or commercial building. This will allow customers to shut off water service when needed to repair leaks or perform other plumbing maintenance. Eureka Public Works should only be called out to shut off water services during emergencies. All customers are encouraged to perform a home or business water audit and install water saving devices such as low flow showerheads, faucet aerators, toilet tank bags, etc. ECPW will provide information on retrofitting home fixtures to customers on request. Many tips for conserving water and guidelines for performing home water audits are contained in Appendix A.

Stage Two

These measures should be implemented when the water system is experiencing drought conditions. Customers should avoid over watering lawns. Sprinklers should be positioned so that no water is running off of the lawn areas and into curbs or gutters. Guidelines for watering lawns, including how to measure water

applied and determine how many minutes a week to water during each month of the growing season are contained in Appendix B.

Stage Three

These measures will be implemented when the water systems are experiencing water shortages due to a drought, limitations in water storage, or water transmission equipment failures or malfunctions. Restricted watering will use the following “odd/even” system adapted to meet the unique attributes of the water system. Residential and commercial customers with odd addresses will restrict watering lawns and outside landscaping to Tuesdays and Saturdays. Residential and commercial customers with even addresses will water on Wednesdays and Sundays. There will be no landscape watering on Mondays, Thursdays and Fridays. No landscape watering will be permitted between the hours of 11:00 AM and 4:00 PM, or during windy conditions.

Stage Four

These watering restrictions will be implemented in the event of emergencies or cataclysmic failure of water system components or equipment. No outside landscape watering will be permitted. Eureka County Public Works shall restrict other water usage as required. In the event of an emergency, it may be necessary to go immediately from Stage 1 to Stage 4.

Plan schedule, review and revision (NRS 540.141 (e) and (f))

Implementation of this Plan is ongoing. ECPW will periodically review the plan and evaluate the effectiveness of the measures contained herein. The plan may be revised to reflect changing needs and conditions of the water systems. A copy of the plan will be available for inspection by members of the public during normal office hours at the ECPW office. A copy of the plan will be mailed to all customers and provided to new customers at time of application. The Plan will also be posted on the Eureka County Public Works website, and will include links to the web-based references cited. Interested persons may submit written views and recommendations on the plan.

Estimate of amount of water conserved annually (NRS 540.141 1 (g))

The average residential service in Eureka uses 541 gallons per day during the period from April to October. By implementing conservation measures as described, it is estimated that the average residential customer save 54 gallons per day, or about 10% of current use, by implementing the conservation measures in the Plan.

Conservation oriented rate structures analysis (NRS 540.141 2. (a) and (b))

Currently, the rate structure at all three ECPW water systems is the Uniform Block Rate. The current rate structure in each system also provides for an annual escalator for a five year period. The unit price for water used (above the amount of gallons included under the base rate) remains the same, regardless of how much water is consumed. This rate structure encourages a reasonable amount of water conservation, since customers pay

more for higher consumption. However, if changing conditions warrant, ECPW may evaluate water rate structures that promote water conservation more effectively, such as an Increasing Block Rates. With Increasing Block Rates, the unit price for water increases as water consumption increases.

Incentives (NRS 540.151 1. (a),(b), and (c))

The water conservation plan of Eureka County Public Works provides incentives to encourage water conservation in its service area, to retrofit existing structures with plumbing fixtures designed to conserve water, and to install water wise landscaping. The newsletter that is provided to customers on a periodic basis contains information and website references to encourage conservation by customers within the service area. The newsletter also communicates to customers that it is their responsibility to conserve water. The newsletter and website references also contain information on choosing water saving plumbing devices and installing landscaping that uses less water.

Implementation

The Water Conservation Plan was approved by the Eureka County Board of Commissioners and the Devil's Gate GID Board on May 18, 2009. The Water Conservation Plan was approved by the State of Nevada on May 4, 2009. Please see "Appendix" signature page for official adoption documentation.

Appendix

Resolution

Resolution adopted by the Eureka County Commissioners and Devil's Gate GID Board on May 18, 2009

Nevada Division of Water Resources

Approval letter from the Nevada Division of Water Resources relating to the Water Conservation Plan for Eureka County.

Public Education Materials

The following information and educational resources are made part of this plan. The titles are listed below, and they are attached and made part of the Appendix. To the extent possible, these resources will be posted or linked on the Eureka County Public Works website.

Overall water conservation

100 Ways to Conserve Water (www.wateruseitwisely.com)

Indoor water conservation

Household Water Saving Tips

Conducting a Household Water Audit

Water Sense Labeled Toilets (EPA)

Water Sense Labeled Bathroom Sink Faucets (EPA)

Outdoor water conservation

The Seven Principles of Xeriscape

The All Seeing All Knowing Lawn Care Manual (University of Nevada Cooperative Extension)

Notes for customers without sprinkler systems (related to Lawn Care Manual)

Eureka County Lawn Evapotranspiration Rates and Seasonal Distribution

Tips for the Home Gardener for Efficient Water Use

Water Conservation and Washing Vehicles

RESOLUTION

**TO ADOPT A JOINT WATER CONSERVATION PLAN FOR THE
TOWN OF EUREKA WATER SYSTEM,
DEVIL'S GATE GID DISTRICT #1 AND DISTRICT #2,
AND CRESCENT VALLEY TOWN WATER SYSTEM**

WHEREAS, the Board of County Commissioners wish to adopt a joint water conservation plan for the Town of Eureka, Devil's Gate GID District 1 & 2, and the Town of Crescent Valley; and

WHEREAS, Eureka County is dedicated to promoting water conservation through public outreach, customer education and responsible stewardship; and

WHEREAS, the water conservation plan will be provided to customers of the Eureka County water systems in an effort to increase public awareness of the limited supply of water in Nevada and the need to conserve water;

WHEREAS, Eureka County has programs in place to identify and reduce water system leakage, inaccuracies in water meters and to monitor distribution system pressures;

WHEREAS, Eureka County acts immediately to repair leaks as soon as they are identified and water operators check each system twice a day;

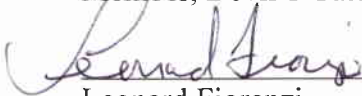
NOW THEREFORE BE IT RESOLVED by the Board of Eureka County Commissioners, who are also the Board of Directors of the Devil's Gate GID Board that:

1. The joint water conservation plan for the Town of Eureka, Devil's Gate GID District #1 & 2, and the Crescent Valley Town be adopted.
2. The joint water conservation plan be available and distributed to users in the Town of Eureka, Devil's Gate GID District 1 & 2 and Crescent Valley Town water systems.

Adopted this 18th day of May, 2009.



J.P. Ithurrealde
Chairman, Eureka County Commissioner
Member, Devil's Gate GID Board




Leonard Fiorenzi
Chairman, Devil's Gate GID Board
Vice-Chair, Eureka County Commissioners

Attest:



County Clerk



Mike Page
Vice Chair, Devil's Gate GID Board
Member, Eureka County Commissioner



DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES

901 S. Stewart Street, Suite 2002
Carson City, Nevada 89701
(775) 684-2800 • Fax (775) 684-2811
<http://water.nv.gov>

May 4, 2009

Ronald Damele, Public Works Director
Eureka County Public Works
701 South Main Street
Eureka, NV 89316

Re: Eureka County Water Conservation Plan

Dear Mr. Damele:

This office has finished the review of the draft water conservation plan for the Joint Water Conservation Plan for the Town of Eureka, Devil's Gate GID Districts No. 1 and 2 and the Crescent Valley Town Water Systems. The plan contains all the statutory elements required under Nevada Revised Statutes (NRS) chapter 540. Please submit a final hard copy version of the water conservation plan for our records, as well as a PDF version on a compact disk that can be posted on the Division of Water Resources website.

The next update to the water conservation plan will be due in 2013 as required by NRS § 540.131(4a).

If you have any questions, please call me at (775) 684-2817.

Sincerely,

A handwritten signature in blue ink, appearing to read "K. Hickenbottom P.E.", with a stylized flourish at the end.

Kelvin Hickenbottom, P.E.
Deputy State Engineer

100 Ways To Conserve Water

<http://www.wateruseitwisely.com/100-ways-to-conserve/index.php>

#01



There are a number of ways to save water, and they all start with you.

- **#2**

When washing dishes by hand, don't let the water run while rinsing. Fill one sink with wash water and the other with rinse water.

- **#3**

Some refrigerators, air conditioners and ice-makers are cooled with wasted flows of water. Consider upgrading with air-cooled appliances for significant water savings.

- **#4**

Adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street.

- **#5**

Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.

- **#6**

Choose shrubs and groundcovers instead of turf for hard-to-water areas such as steep slopes and isolated strips.

- **#7**

Install covers on pools and spas and check for leaks around your pumps.

- **#8**

Use the garbage disposal sparingly. Compost vegetable food waste instead and save gallons every time.

- **#9**

Plant in the fall when conditions are cooler and rainfall is more plentiful.

#10



For cold drinks keep a pitcher of water in the refrigerator instead of running the tap. This way, every drop goes down you and not the drain.

- **#11**

Monitor your water bill for unusually high use. Your bill and water meter are tools that can help you discover leaks.

- **#12**

Water your lawn and garden in the morning or evening when temperatures are cooler to minimize evaporation.

- **#13**

Wash your fruits and vegetables in a pan of water instead of running water from the tap.

- **#14**

Spreading a layer of organic mulch around plants retains moisture and saves water, time and money.

- **#15**

Use a broom instead of a hose to clean your driveway and sidewalk and save water every time.

- **#16**

If your shower fills a one-gallon bucket in less than 20 seconds, replace the showerhead with a water-efficient model.

- **#17**

Collect the water you use for rinsing fruits and vegetables, then reuse it to water houseplants.

- **#18**

If water runs off your lawn easily, split your watering time into shorter periods to allow for better absorption.

- **#19**

We're more likely to notice leaks indoors, but don't forget to check outdoor faucets, sprinklers and hoses for leaks.

- **#20**

If you have an automatic refilling device, check your pool periodically for leaks.

- **#21**

Check the root zone of your lawn or garden for moisture before watering using a spade or trowel. If it's still moist two inches under the soil surface, you still have enough water.

- **#22**

When buying new appliances, consider those that offer cycle and load size adjustments. They're more water and energy efficient.

- **#23**

Shorten your shower by a minute or two and you'll save up to 150 gallons per month.

- **#24**

Upgrade older toilets with water efficient models.

- **#25**

Adjust your lawn mower to a higher setting. A taller lawn shades roots and holds soil moisture better than if it is closely clipped.

- **#26**

When cleaning out fish tanks, give the nutrient-rich water to your plants.

- **#27**

Use sprinklers for large areas of grass. Water small patches by hand to avoid waste.



Put food coloring in your toilet tank. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it can save up to 1,000 gallons a month.

- **#29**

When running a bath, plug the tub before turning the water on, then adjust the temperature as the tub fills up.

- **#30**

Walkways and patios provide space that doesn't ever need to be watered. These useful "rooms" can also add value to your property.

- **#31**

Collect water from your roof to water your garden.

- **#32**

Designate one glass for your drinking water each day or refill a water bottle. This will cut down on the number of glasses to wash.

- **#33**

Rather than following a set watering schedule, check for soil moisture two to three inches below the surface before watering.

- **#34**

Install a rain sensor on your irrigation controller so your system won't run when it's raining.

- **#35**

Don't use running water to thaw food. Defrost food in the refrigerator for water efficiency and food safety.



Use drip irrigation for shrubs and trees to apply water directly to the roots where it's needed.

- **#38**

Reduce the amount of lawn in your yard by planting shrubs and ground covers appropriate to your site and region.

- **#39**

When doing laundry, match the water level to the size of the load.

- **#40**

Teach your children to turn off faucets tightly after each use.

- **#41**

Remember to check your sprinkler system valves periodically for leaks and keep the sprinkler heads in good shape.



Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.

- **#43**

Soak pots and pans instead of letting the water run while you scrape them clean.

- **#44**

Don't water your lawn on windy days when most of the water blows away or evaporates.

- **#45**

Water your plants deeply but less frequently to encourage deep root growth and drought tolerance.

- **#46**

Know where your master water shut-off valve is located. This could save water and prevent damage to your home.

- **#47**

To decrease water from being wasted on sloping lawns, apply water for five minutes and then repeat two to three times.

- **#48**

Group plants with the same watering needs together to avoid overwatering some while underwatering others.

- **#49**

Use a layer of organic material on the surface of your planting beds to minimize weed growth that competes for water.

- **#50**

Use a minimum amount of organic or slow release fertilizer to promote a healthy and drought tolerant landscape.

- **#51**

Trickling or cascading fountains lose less water to evaporation than those spraying water into the air.

- **#52**

Use a commercial car wash that recycles water.

- **#53**

Avoid recreational water toys that require a constant flow of water.

- **#54**

Turn off the water while brushing your teeth and save 25 gallons a month.

- **#55**

Use a rain gauge, or empty tuna can, to track rainfall on your lawn. Then reduce your watering accordingly.

- **#56**

Encourage your school system and local government to develop and promote water conservation among children and adults.

- **#57**

Learn how to shut off your automatic watering system in case it malfunctions or you get an unexpected rain.

- **#58**

Set a kitchen timer when watering your lawn or garden to remind you when to stop. A running hose can discharge up to 10 gallons a minute.

- **#59**

If your toilet flapper doesn't close after flushing, replace it.

- **#60**

Make sure there are water-saving aerators on all of your faucets.



Next time you add or replace a flower or shrub, choose a low water use plant for year-round landscape color and save up to 550 gallons each year.

- **#62**

Install an instant water heater near your kitchen sink so you don't have to run the water while it heats up. This also reduces energy costs.

- **#63**

Use a grease pencil to mark the water level of your pool at the skimmer. Check the mark 24 hours later to see if you have a leak.

- **#64**

If your dishwasher is new, cut back on rinsing. Newer models clean more thoroughly than older ones.

- **#65**

Use a trowel, shovel, or soil probe to examine soil moisture depth. If the top two to three inches of soil are dry it's time to water.

- **#66**

If installing a lawn, select a turf mix or blend that matches your climate and site conditions.

- **#67**

When you save water, you save money on your utility bills too. Saving water is easy for everyone to do.

- **#68**

When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.

- **#69**

Make sure your swimming pools, fountains, and ponds are equipped with recirculating pumps.

- **#70**

Bathe your young children together.

- **#71**

Consult with your local nursery for information on plant selection and placement for optimum outdoor water savings.

- **#72**

Winterize outdoor spigots when temperatures dip below freezing to prevent pipes from leaking or bursting.

- **#73**

Insulate hot water pipes for more immediate hot water at the faucet and for energy savings.

- **#74**

Wash your car on the lawn, and you'll water your lawn at the same time.



Drop your tissue in the trash instead of flushing it and save water every time.

- **#76**

Direct water from rain gutters and HVAC systems toward water-loving plants in the landscape for automatic water savings.

- **#77**

Make suggestions to your employer about ways to save water and money at work.

- **#78**

Support projects that use reclaimed wastewater for irrigation and industrial uses.

- **#79**

Use a hose nozzle or turn off the water while you wash your car. You'll save up to 100 gallons every time.

- **#80**

Share water conservation tips with friends and neighbors.

- **#81**

If your toilet was installed before 1992, reduce the amount of water used for each flush by inserting a displacement device in the tank.

- **#82**

Setting cooling systems and water softeners for a minimum number of refills saves both water and chemicals, plus more on utility bills.

- **#83**

Washing dark clothes in cold water saves both on water and energy while it helps your clothes to keep their colors.

- **#84**

Leave lower branches on trees and shrubs and allow leaf litter to accumulate on the soil. This keeps the soil cooler and reduces evaporation.

- **#85**

Report broken pipes, open hydrants and errant sprinklers to the property owner or your water provider.

- **#86**

Let your lawn go dormant during the summer. Dormant grass only needs to be watered every three weeks or less if it rains.

- **#87**

Plant with finished compost to add water-holding and nutrient-rich organic matter to the soil.

- **#88**

Use sprinklers that deliver big drops of water close to the ground. Smaller water drops and mist often evaporate before they hit the ground.

- **#89**

Listen for dripping faucets and running toilets. Fixing a leak can save 300 gallons a month or more.

- **#90**

Water only when necessary. More plants die from over-watering than from under-watering.

- **#91**

One more way to get eight glasses of water a day is to re-use the water left over from cooked or steamed foods to start a scrumptious and nutritious soup.



Adjust your watering schedule each month to match seasonal weather conditions and landscape requirements.

- **#93**

Turn off the water while you wash your hair to save up to 150 gallons a month.

- **#94**

Wash your pets outdoors in an area of your lawn that needs water.

- **#95**

When shopping for a new clothes washer, compare resource savings among Energy Star models. Some of these can save up to 20 gallons per load, and energy too.

- **#96**

Apply water only as fast as the soil can absorb it.

- **#97**

Aerate your lawn at least once a year so water can reach the roots rather than run off the surface.

- **#98**

When washing dishes by hand, fill the sink basin or a large container and rinse when all of the dishes have been soaped and scrubbed.

- **#99**

Catch water in an empty tuna can to measure sprinkler output. One inch of water on one square foot of grass equals two-thirds of a gallon of water.

- **#100**

Turn off the water while you shave and save up to 300 gallons a month.

- **#101**

When you give your pet fresh water, don't throw the old water down the drain. Use it to water your trees or shrubs.

- **#102**

If you accidentally drop ice cubes when filling your glass from the freezer, don't throw them in the sink. Drop them in a house plant instead.

- **#103**

To save water and time, consider washing your face or brushing your teeth while in the shower.

- **#104**

While staying in a hotel or even at home, consider reusing your towels.

- **#105**

When backflushing your pool, consider using the water on your landscaping.

- **#106**

For hanging baskets, planters and pots, place ice cubes under the moss or dirt to give your plants a cool drink of water and help eliminate water overflow.

- **#107**

Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent using the garbage disposal.

- **#108**

When you have ice left in your cup from a take-out restaurant, don't throw it in the trash, dump it on a plant.

- **#109**

Have your plumber re-route your gray water to trees and gardens rather than letting it run into the sewer line. Check with your city codes, and if it isn't allowed in your area, start a movement to get that changed.

- **#110**

Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.

- **#111**

When you are washing your hands, don't let the water run while you lather.

<http://www.wateruseitwisely.com/100-ways-to- conserve/index.php>

Household Water Saving Tips

Nevadans have access to an abundance of water much of the time, so the importance of clean water is often overlooked. For most of us, water use is a habit. We are accustomed to having water available at the twist of a faucet. We usually do not think about how much water we use.

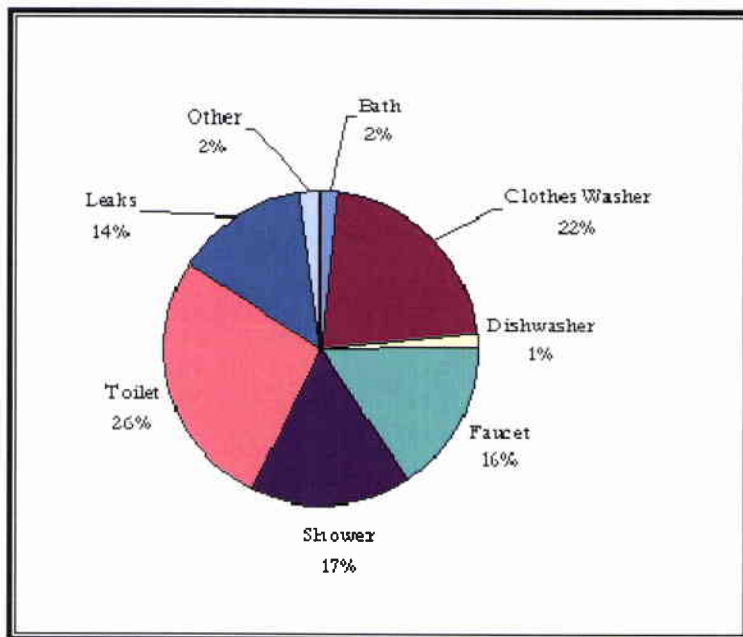
AVERAGE DAILY WATER USE

Be aware of how much water you use! Awareness is the first step in conservation. The average US citizen uses almost **100** gallons of water per person per day on the following activities:

- Toilet
- Bathing & hygiene
- Laundry
- Kitchen
- Housekeeping
- Outdoor Activities

Indoor water use by fixture is shown in the following graph:

Indoor Per Capita Use by Fixture Source: AWWA, 1999



You can determine your average daily water use by conducting a household water audit. See [Conducting a Household Water Audit](#)

WATER SAVINGS

The amount of savings depends on current water consumption habits, water, sewer and energy costs, current flow rates of fixtures and flush volumes of toilets, system pressure, and the amount of water leakage through fittings and toilets. Water can be conserved by making improvements in the home or by modifying behavior.

Retrofit or Replace Water Fixtures

Water-saving devices are economical and permanent. Low-flow showerheads and faucet aerators save valuable water and energy used to heat water without requiring changes in personal water use habits. The following chart highlights how much water can be conserved by installing water-saving equipment in place of conventional plumbing fixtures, fittings and appliances.

Conventional Fixture/Appliance	Water Use (gallons)	Water Saving Fixture/Appliance	Water Use (gallons)	Water Savings (gallons)
Vintage Toilet*	4 - 6 per flush	Low Consumption Toilet***	1.6 per flush	2.4 - 4.4 per flush
Conventional Toilet**	3.5 per flush	Low Consumption Toilet***	1.6 per flush	1.9 gal/flush
Conventional Showerhead*	3-10 per min	Low-Flow Showerhead	2-2.5 per min	0.5 - 8 per min
Faucet Aerator*	3-6 per min	Flow Regulating Aerator	0.5-2.5 per min.	0.5- 5.5 per min
Top-Loading Washer	40-55 per load	Front-Loading Washer	22-25 per load	15 - 33 per load

* Manufactured before 1978

** Manufactured from 1978 to 1993

*** Manufactured since January 1, 1994

Repair All Leaks

A dripping faucet is more than annoying...it is expensive. Even small leaks can waste significant amounts of water. Hot water leaks are a waste of water and of the energy used to heat the water.

Leaks inside the toilet can waste up to 200 gallons of water a day. Toilet leaks can be detected by adding a few drops of food coloring to water in the toilet tank. If the colored water appears in the bowl, the toilet is leaking.

If you have a leaking faucet or toilet, stop pouring money down the drain and repair it.

How to Save Water in The Bathroom

- When constructing a new home or remodeling your bathroom, install low consumption (1.6 gal/flush) toilets.
- Place a weighted plastic one-half gallon jug or a toilet dam in the tanks of conventional toilets to displace and save water with each flush.
- Install low-flow aerators and showerheads. They are inexpensive, easy to install, and save water and energy.
- Do not let the faucet flow while brushing your teeth or shaving. Use a glass of water for rinsing teeth.
- Take showers instead of tub baths. Consider bathing small children together.
- If your shower has a single-handle control or shut off valve, turn off the flow while soaping or shampooing.
- Leaking diverter valves (valves which divert water from the tub spout to the showerhead) should be replaced.

How to Save Water in The Kitchen And Laundry Room

- Refrigerate a pitcher of drinking water instead of letting a faucet flow until the water is cold enough to drink.
- Use a dishpan or plug the sink for washing and rinsing dishes. Install a low-flow aerator on all faucets.
- Do not pre-rinse dishes prior to loading in a dishwasher. Prerinsing is an unnecessary and wasteful use of water.
- Operate the washing machine and dishwasher only when they are fully loaded.
- Use the proper water level or load size selection on the washing machine.
- When purchasing a washing machine or dishwasher, consider water consumption as well as energy efficiency. Most manufacturers now provide this information to consumers.

How to Save Water Outside The Home

Watering of lawns and gardens can double normal household water use during the hot, dry summer months. At standard household water pressures, a garden hose will discharge up to 10 gallons of water per minute. To apply an inch of water to 1,000 square feet of lawn or garden requires close to 1,000 gallons of water.

Watering should be limited to gardens, and newly planted lawns and landscaped areas. Established lawns and landscape plantings will usually survive without watering. Inadequate watering encourages shallow root growth and increases the risk of mortality. When water is scarce, your community or individual water supply should be reserved for your most essential needs.

- Equip your hose with an automatic shut-off nozzle.
- Use a broom, not a hose, to clean driveways, steps and sidewalks.
- Water your garden during the coolest part of the day. Do not water on windy days.
- Use mulch around shrubs and garden plants to reduce evaporation from the soil surface and cut down on weed growth.

Source: Rural Community Assistance Corp.

CONDUCTING A HOUSEHOLD WATER AUDIT

WHAT IS A HOUSEHOLD WATER AUDIT?

A household water audit is an assessment of how much water is used and how much water can be saved in the home. Conducting a water audit involves calculating water use and identifying simple ways for saving water in the home.

WHAT ARE THE BENEFITS OF CONDUCTING A WATER AUDIT?

Conducting a water audit can help you save money by reducing your home water bill (and sewer bill if you are connected to a public sewer system). Conducting a water audit will make you aware of how you use your water and help to identify ways you can minimize water use by implementing certain conservation measures. It is possible to cut your water usage by as much as 30 percent by implementing simple conservation measures and without drastically modifying your lifestyle.

HOW DO I CALCULATE WATER USAGE IN MY HOME?

It is important to realize that water use throughout the year often varies with the season. Most people use more water in the warmer months for gardening, washing cars, and other outdoor uses. If you conduct your water audit in the winter or fall, you should still consider the additional water you use in the summer months. The American Water Works Association (AWWA) estimates that the average indoor water use per person is 94 gallons of water per day; this does not take into account outdoor water use (watering lawns, washing cars).

Calculating Water Use From Your Water Bill



If you obtain water from a community water system, you probably receive a water bill that tells you how much water you use. Many water utilities provide customers with bills that contain information regarding the amount of water consumed and average daily consumption during the billing period. If the average daily consumption is not provided, you can calculate it by dividing the total amount of water used by the number of days in the billing period. Determine whether your water is measured in cubic meters (m^3), cubic feet (ft^3), gallons (gal), or liters (L) and convert to gallons.

For converting into gallons, use the following conversion factors:

$$m^3 \times 264 = \text{gal}$$

$$ft^3 \times 7.48 = \text{gal}$$

$$L \times 0.264 = \text{gal}$$

There are several conversion tools available on the Internet that can be used to make your calculations easier. (<http://www.onlineconversion.com/volume.htm> or <http://www.mathconnect.com/volumel.htm>)

Calculating Water Use With A Meter

If your water bill does not provide water consumption data, then you can read your water meter to obtain this information. Water meters measure the total amount of water used in your home and are usually located at the property line or on the house. The meter may measure in cubic meters, cubic feet, gallons, or liters. To obtain your water use over the course of a 24-hour day, read your meter at the same time on two consecutive days. You may want to measure water use for several days and then calculate a daily average.

Estimating Water Use Without A Meter

If you do not have a water meter you can estimate your water use. It will be important to measure all water use, indoor and outdoor, to accurately estimate the quantity of water used. To determine how much you consume water in your home it is necessary to measure water flow from each fixture in your house:

- To calculate flow for faucets (indoor and outdoor) and showerheads, turn faucet to the normal flow rate that you use, and hold a container under the tap for 10 seconds and measure the quantity of water in the container. Multiply the measured quantity of water by 6 to calculate the gallons per minutes (gpm).
- To calculate flow for toilets, turn off the water supply to the toilet, mark the water line on the inside of the tank, flush, and then fill tank with water from tap. Measure the volume of water that is required to fill water back up to the water line mark on the tank and record this number. Turn water on to the toilet to resume normal use.
- If your appliances or fixtures are relatively new, you may be able to obtain the flow rate from the manufacturer's specifications. Otherwise, use the following averages:
 - Washing machine – 41 gal per use
 - Dishwashing machine – 9 gal per use

Next, measure how many times per day or how many minutes each day you use each fixture or appliance. Multiply the water flow per fixture by the minutes per day the fixture is used. Multiply the flow average for each appliance by the number of times the appliance is used each week. Don't forget to include the amount of time you use outdoor faucets each day. The [water audit spreadsheet](#) is a useful tool to evaluate water use in the home.

HOW DOES MY WATER USAGE RANK?

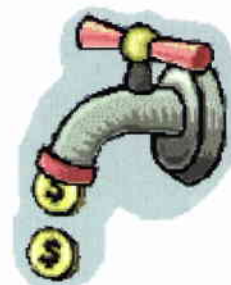
The average Maryland citizen uses about 100 gallons of water per day. This includes indoor as well as outdoor water usage. To calculate the per person daily water usage rate, divide your daily water usage by the number of people in your home, and then look at the following chart to rate your water usage.

Gallons Per Person Per Day	Rank	Comments
<80 gal/day	Excellent	Wow! You use water wisely. Please share your conservation techniques with friends and neighbors.
80 – 100 gal/day	Good	Good Job! You use less water than the average Maryland citizen. Look at the conservation tips below to learn how you can conserve even more water.
101 – 120 gal/day	Fair	You use more water than the average Maryland citizen. Read the conservation tips below to learn how you can conserve water.
>120 gal/day	Poor	You use a lot of water. Read the conservation tips below to learn how to conserve water in the home.

HOW CAN I CONSERVE WATER?

Check for Leaks

An average of about 14 percent of residential water is lost through leaking fixtures or pipes. You still pay for this water!



An easy way to check whether you have leaks in your house is to read your water meter. Turn off all water fixtures inside and outside your home, and check the reading on your water meter. Wait one hour, ensuring that no one uses any water, and then check the meter again. If the meter reading has changed, you have a leak somewhere in your home.

Pipes

A leaky pipe is usually pretty obvious. Visually inspect all pipes in your home and look for telltale watermarks on walls or ceilings. In the yard, the ground above the water line may stay wet continuously or water may actually flow on the surface. If a pipe is leaking, repair or replace it.

Toilets

Leaking toilets are common and can be large sources of water loss. A leaking toilet can waste anywhere from several gallons to more than 100 gallons per day (that's over a quarter million gallons per year!). Leaking toilets are not as easily identifiable as leaking faucets. The following are clues that you may have a leak:

- If you have to jiggle the handle to make a toilet stop running;
- If you regularly hear sounds from a toilet that is not being used; or
- If a toilet periodically turns the water on ("runs") for 15 seconds or so without anyone touching the handle.

Even if your toilet does not display any of the above symptoms, it could still be leaking. These “silent leaks” can go undetected for long periods of time, potentially wasting thousands of gallons of water.

To check your toilet for silent leaks, do the following:

- Remove the cover on the toilet tank and set it aside;
- Remove any “in-tank” bowl cleaners and flush so that water in the bowl and tank are clear;
- Add dye to the tank (You can use dye capsules or tablets from the hardware store, but food coloring or powdered fruit drink mixes work well). Use enough dye so that the water has a deep hue;
- Wait for 30 minutes (Do not use toilet during this time period);
- If after 30 minutes the water in the bowl contains dye, then the toilet is leaking (A properly operating toilet will store water in the tank indefinitely without any water running into the bowl).

There are two possible culprits when a toilet leaks, the flush valve or the refill valve. To determine which valve is responsible for the leak, draw a pencil line on the inside of the tank at the water line. Turn the water supply for the toilet off (located behind the toilet) and wait for 20 to 30 minutes. If the water level remains the same, it means the leak is occurring at the refill valve (unit in the left side of the tank). If the water level falls below the pencil mark, the flush valve (unit located in the center of the tank) is leaking.

Most homeowners are capable of making their own toilet repairs. Visit your local home improvement or hardware store, purchase the parts, turn off the water supply to the toilet, and follow the directions. With a little effort, you can conserve many gallons of water and reduce your water bill at the same time.

Faucets

A leaking faucet is easily identified, but do you know how much water can be wasted from what seems like an insignificant drip?

To find out, count the number of drips per minute. You can use the following chart to estimate the amount of water waste, or you can use WaterWiser’s© [drip calculator](#).

Estimated Water Loss Through Leaks		
Drips per minute	Water Wasted per Month	Water Wasted per Year
10	43 gallons	526 gallons
30	130 gallons	1,577 gallons
60	259 gallons	3,153 gallons
120	518 gallons	6,307 gallons
300	1,296 gallons	15,768 gallons

Drips can usually be eliminated by replacing worn washers, or by tightening or repacking the faucet. Replacement washers or repair kits for washerless faucets are available at hardware or home improvement stores.

Retrofit/Replace Fixtures and Appliances

Once you have repaired any leaks in your home, the next step is to evaluate the efficiency of your current fixtures and appliances. Often simple retrofits can conserve a lot of water. The following table provides average water use for conventional and low-flow appliances.

Fixture/Fitting/Appliance	Water Use In Gallon Per
Vintage Toilet*	4-6 flush
Conventional Toilet**	3.5 flush
Low Consumption Toilet***	1.6 flush
Conventional Showerhead*	3-10 min
Low-Flow Showerhead	2-2.5 min.
Faucet Aerator*	3-6 min.
Flow Regulating Aerator	0.5-2.5 min.
Top-Loading Washer	40-55 load
Front-Loading Washer	22-25 load
Dishwasher	8-12 load
* Manufactured before 1978	
** Manufactured from 1978 to 1993	
*** Manufactured since January 1, 1994	

Faucets

Retrofitting your faucet with an aerator will help save water in your home. A faucet aerator is a small circular screen that is screwed into the faucet. It reduces flow by adding air to the water, giving the sensation of more water with less volume. An aerator can reduce the flow to about 1 to 2 gpm, reducing your water use by half. Aerators are inexpensive and easy to install.

Check to see if aerators are installed on any faucets. Even if aerators have been installed, they may be older and less efficient. If the flow from your faucet exceeds 2.5 gpm, you should install a new aerator. Some older faucets may not be able to accommodate an aerator. If this is the case or if for any other reason you need to install a new faucet, you should purchase and install a faucet that uses less than 2.5 gpm.

Toilets

The best way to improve toilet efficiency is to replace an old inefficient toilet with a new toilet. Toilets made before 1993 use between 3.5 gallons per flush (gpf) and 8 gpf. New high efficiency toilets use 1.6 gpf or less. Depending on how inefficient your old toilet is, you could



reduce your water use by up to 75 percent by installing a new efficient toilet. There are other alternative toilets available, including waterless toilets and composting toilets. Fixtures must comply with Code of Maryland Regulations (your certified plumber is aware of these regulations).

You can reduce water use in older toilets easily and inexpensively by simply installing a displacement device. You can save a half-gallon per flush, which equates to, on average, 12 gallons per day per household. These devices work by displacing water in the tank, thereby reducing the water used per flush. Hardware stores sell plastic or rubber bags that can be filled with water and hung from the side of the tank, or you can place some pebbles in an empty half-gallon milk jug, or other durable container, and fill it with water. Toilet dams work in a similar fashion, by blocking off an area of the toilet tank to decrease the amount of water per flush. Another device that can be used is an early closure device that causes the flapper to close early, releasing a reduced amount of water per flush. Do not place bricks in your toilet tank as they can dissolve and cause future plumbing problems.

Showerheads

Low-volume showerheads use 2.5 gpm or less (older ones use as much as 5 gpm or more), resulting in a water savings as great as 50 percent (on average, about 38 gallons per day per household saved). Low-volume showerheads conserve water through mixing air and water and using different spray patterns to give the sensation of a higher-volume shower.

Some showerheads also feature temporary shut-off valves that allow the user to turn off the water while shampooing or washing while maintaining the desired temperature the same. Conserving water in the shower will also lead to substantial energy savings, since showers use hot as well as cold water.



Appliances

On average about 22 percent of indoor residential water is used to wash clothes. The best way to improve clothes washer efficiency is to replace an old inefficient machine with a new high efficiency washer. Traditional clothes washers use approximately 41 gallons per load (gpl) and high efficiency models use a little more than half that, about 23 gpl.

Dishwashers account for only about 1.5 percent of indoor residential water use; however, more efficient models will reduce water use by about 50 percent. It is usually more efficient to wash a full load of dishes in the dishwasher rather than hand washing the same dishes in the sink.

Examine and Modify Your Habits

Some of the simplest and least expensive ways to conserve water involve making small changes in how you use water. A complete water audit should involve a close look at your family's water use habits.

For example:

- Do you let the water run while you brush your teeth or shave?
- Do you run your clothes washer or dishwasher before it is fully loaded?
- Do you take long showers or baths?
- Do you use a dishpan or plug the sink when washing and rinsing dishes by hand?
- Do you pre-rinse your dishes prior to loading them in the dishwasher?
- Do you have an automatic shut-off nozzle on your outdoor hose?
- Do you water your plants during the coolest part of the day?

See our [Water Conservation Tips for Homeowners](#) for a comprehensive list of suggestions you might want to consider to help you conserve water in your home.

References

American Water Works Association. March 2003. <http://www.awwa.org/advocacy/learn/>

California Urban Water Conservation Council. March 2003. H₂OUSE Water Saver Home.
<http://www.h2ouse.org/>

Toiletology 101. March 2003. <http://www.toiletology.com/index.shtml>

Vickers, Amy. 2001. Water Use and Conservation. WaterPlow Press. Amhearst, MA. 446 p.

WaterWiser Drip Calculator. March 2003.
<http://www.awwa.org/advocacy/learn/conserve/dripcalc.cfm>

Maryland Department of the Environment
Water Supply Program
1800 Washington Boulevard
Baltimore, Maryland 21230

For questions, please call 410-537-3706



WaterSense® Labeled Toilets



Toilets are by far the main source of water use in the home, accounting for nearly 30 percent of residential indoor water consumption. Toilets also happen to be a major source of wasted water due to leaks and/or inefficiency. WaterSense, a program sponsored by the U.S. Environmental Protection Agency (EPA), is helping consumers identify high-performance, water-efficient toilets that can reduce water use in the home and help preserve the nation's water resources.



What Are WaterSense Labeled Toilets?

Recent advancements have allowed toilets to use 20 percent less water than the current federal standard, while still providing equal or superior performance. The WaterSense label is used on toilets that are certified by independent laboratory testing to meet rigorous criteria for both performance and efficiency. Only high-efficiency toilets that complete the third-party certification process can earn the WaterSense label.

How Much Can WaterSense Labeled Toilets Save?

Over the course of your lifetime, you will likely flush the toilet nearly 140,000 times. If you replace older, existing toilets with WaterSense labeled models, you can save 4,000 gallons per year with this simpler, greener choice.

What About Price?

WaterSense labeled toilets are available at a wide variety of price points and a broad range of styles. EPA estimates that a family of four that replaces its home's older toilets with WaterSense labeled models will, on average, save more than \$90 per year in reduced water utility bills, and \$2,000 over the lifetime of the toilets. Additionally, in many areas, utilities offer rebates and vouchers that can lower the price of a WaterSense labeled toilet.

And Performance?

Unlike some first-generation, "low-flow" toilets, WaterSense labeled toilets combine high efficiency with high performance. Design advances enable WaterSense labeled toilets to save water with no trade-off in flushing power. In fact, many perform better than standard toilets in consumer testing.

Look for the WaterSense Label!

Whether remodeling a bathroom, starting construction of a new home, or simply replacing an old, leaky toilet that is wasting money and water, installing a WaterSense labeled toilet is a high-performance, water-efficient option worth considering. If every American home with older, inefficient toilets replaced them with new WaterSense labeled toilets, we would save nearly 640 billion gallons of water per year, equal to more than two weeks of flow over Niagara Falls! Go to www.epa.gov/watersense for more information.





WaterSense® Labeled Bathroom Sink Faucets



Most of us know we can save water if we turn off the tap while brushing our teeth (as much as 3,000 gallons per year!), but did you know that there are products that will help save water when you turn on the tap too? WaterSense, a program sponsored by the U.S. Environmental Protection Agency (EPA), can help you identify high-performance, water-efficient bathroom sink faucets and faucet accessories that can reduce water use in the home and help preserve the nation's water resources.

Faucet Flows

Faucets account for more than 15 percent of indoor household water use—more than 1 trillion gallons of water across the United States each year.

WaterSense labeled bathroom sink faucets and accessories can reduce a sink's water flow by 30 percent or more without sacrificing performance. We could save billions of gallons each year by retrofitting the country's 222 million bathroom sink faucets with models that have earned the WaterSense label.

The WaterSense Label

All products bearing the WaterSense label complete a third-party certification process that includes independent laboratory testing to ensure they meet EPA criteria. Faucets and faucet accessories—products that can be attached easily to existing faucets to save water—that obtain the WaterSense label will have demonstrated both water efficiency and the ability to provide adequate flow.



WaterSense Savings

By installing WaterSense labeled bathroom sink faucets or faucet accessories, an average household can save more than 500 gallons each year. Also, since these water savings will reduce demands on water heaters, households will also save energy. Achieving these savings can be as easy as twisting on a WaterSense labeled aerator, which can cost as little as a few dollars.

If every household in the United States installed WaterSense labeled bathroom sink faucets or faucet accessories, we could save more than \$350 million in water utility bills and more than

60 billion gallons of water annually—enough to meet public water demand in Miami for more than 150 days! In addition, U.S. homes could avoid about \$600 million in energy costs for heating water.



Look for WaterSense Labeled Faucets and Accessories!

Whether replacing an older, inefficient faucet that's wasting water and money, or simply looking for options to reduce water use in your home, choose a WaterSense labeled bathroom sink faucet or faucet accessory. The next time you wash your hands or brush your teeth, you'll know that you're doing your part to help protect our precious water resources.

For more information, please visit the WaterSense Web site <www.epa.gov/watersense>.

Seven Principles of Xeriscaping

1. **Planning and Design** - Have a Plan. Take a look at your garden's topography, exposure and soil. Don't try to fight your site. Create planting zones and group your plants by their needs. For example, groups tough, drought tolerant plants in areas exposed to full day sun, give less tolerant plants some partial shade and keep the more delicate or demanding plants for a spot near your water source.
2. **Choose Appropriate Plant Material** - You may choose to incorporate a few plants that will need to be coddled, but for the most part, selecting plants that thrive in your area during low water conditions will give you the best results. This often includes native plants that we so often take for granted. The choice of plants will vary by region, even within a single yard. You may also be surprised to see how many plants are considered xeric, once they have established themselves and when properly cared for.
3. **Soil Improvement** - The old adage that if you take care of the soil, the soil will take care of the plants, is very true here. The key, as always, is incorporating generous amounts of organic matter. This will improve water penetration and retention in any type of soil. Rich, loose, water holding soil will encourage good root development and lessen the plant's need for supplemental water. It is best to amend your soil before planting and to regularly use organic mulch, as mentioned in Step 4.
4. **Mulch** - Mulching is a naturally occurring process, but as gardeners we tend to want things tidy and we rake away all the leaves and debris that coat and decay into the soil. So we have to bring in more aesthetically pleasing mulch, such as shredded bark and compost.

However it gets there, mulch adds a great deal to your garden. It moderates soil temperature, holds moisture, slows erosion and suppresses weeds that would compete with your plants for food and water. It also gradually decomposes and feeds the soil. Apply about 4 inches of mulch at the initial planting and check it each season to see if it needs to be replenished.

5. **Practical and Appropriate Turf Areas** - Most of us still want some areas of lawn in our landscape and many of us want way too much lawn. Think about how much water, fertilizer and gasoline it takes to keep your lawn green throughout the summer.

Where to place the lawn should be part of your initial design plan, taking into consideration what you plan to use your lawn for. If you are using grass as a ground cover, there are other options that would be less labor and water intensive.

Choose an appropriate grass seed for the lawn's exposure. Different seeds do well in different regions. Kentucky Blue grass is beautiful, but it can also be a water hog where it's not happy.

6. **Efficient Watering** - Not all plants need the same amount of water and those needs may change with the seasons. If you've followed the steps above, you have your plants grouped by their water needs, including your lawn, and can water only where it's needed.

Drip irrigation systems are often recommended for efficient watering. These systems allow you to control when and how much water a plant gets and to direct the water only to the plants that need it.

Base your watering schedule on the needs of the plants and not on an arbitrary schedule. All plants will require more supplemental watering for the first year or two that they are becoming established. However after they have acclimated and developed a good root system, supplemental watering should become much less frequent.

7. **Appropriate Maintenance** - Yes, even a xeriscape garden will require some maintenance. Watering, weeding, pruning, deadheading and sensible pest management will all factor into the quality of your garden.

Here's a list of some [drought tolerant plants](#) for your garden.

Many plants will continue to grow just fine in drought conditions, if they have been selected wisely and were allowed to establish themselves before being stressed by drought. No plant will survive forever without some water and different plants will thrive in different regions and conditions, but here is a list of great garden plants to get you started.

A Partial List of Drought Tolerant Plants

- [Achillea](#) (Yarrow)
- Alyssum

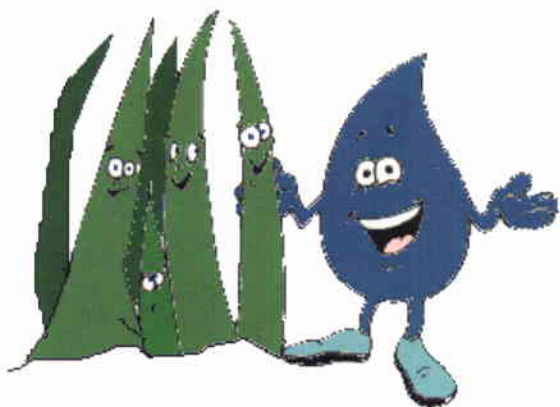
- Artemisia
- Asclepias (Butterfly Weed)
- Beebalm
- California Poppy
- Campanula carpatica (Bellflower)
- Campis (Trumpet vine)
- [Coreopsis](#)
- Cosmos
- Cranesbill Geranium
- Daylily
- [Echinacea](#) Coneflower
- Euphorbia
- [Gaillardia](#)
- Goldenrod
- [Greek oregano](#)
- Heliopsis
- Hosta
- Iris
- Kniphofia (Red Hot Poker)
- [Lamb's Ears](#)
- [Lavender](#)
- Liatris
- [Nasturtium](#)
- [Nepeta](#) Catmint
- Penstemon
- [Perovskia](#) (Russian Sage)
- Portulaca
- Rudbeckia
- Salvia nemerosa
- [Sedum](#)
- Tradescantia (Spiderwort)
- Veronica
- [Zinnia](#)

Grasses

- Feather Reed Grass (Calamagrostis acutiflora)
- Fescue
- Fountain Grass (Pennisetum)
- Maiden Grass (Miscanthus)
- Switch Grass (Panicum)

Shrubs

- Amelanchier (Shadbush)
- Aronia (Chokeberry)
- [Buddleia](#) (Butterfly Bush)
- Caryopteris
- Cotoneaster
- Hypericum (St. Johnswort)
- Juniper
- Potentilla
- Cytisus (Scotch Broom)
- [Viburnum](#)



The All Seeing All Knowing Lawn Care Manual

Your Lawn and Water

Your lawn is more than just grass. It's one of the things that makes a house a home. We walk on it, play on it, and even lie down on it to watch the clouds roll by on a summer day. It also helps the environment by trapping many pollutants before they can get into the ground water.

Imagine the perfect lawn. A green velvet carpet that's cool on your feet and springs back when you walk on it.

This can be your lawn and with less water-more than 20 percent less-than you may already be using.

We've developed a system that will let you water less and still have an attractive lawn. It will show you how to use just the right amount of water to replace moisture that is lost from the soil and grass.

We call it "EvapoTranspiration"-ET for short.

The ET method of lawn watering helps us save Nevada's most precious resource -water. ET also helps improve water quality. By watering less, you avoid runoff. Overwatering causes more water to run off than soak in. This runoff could carry pollutants from the gutter into our surface water supply.

The two key ingredients to using water efficiently are knowing how much water your sprinkler system puts on your lawn and how much water your lawn needs.

This manual explains how you can determine both, through the ET system.

By using ET, you can save water, time and money and still enjoy:

- A cool, green lawn
- Cleaner water
- The pride of knowing you are making a difference.

Turf Tip #1 Check Your Sprinklers

Good watering practices begin from the ground up, so let's start with the sprinklers.




First, check your sprinkler system. This will tell you if you're getting even water distribution. Dry, brown spots and wet, swampy areas in your lawn are the most obvious signs that there's a problem with your sprinklers.

Another sign is water constantly draining from the sprinkler system and running into the gutter. This could indicate a broken line, a plugged valve or stuck automatic drain valve.

Even a well-designed sprinkler system needs regular checkups and necessary corrections

Sprinkler Problem	Solution
Clogged sprinkler heads.	Clean sprinkler heads by removing and blowing them out. If you can't unclog them, replace them.
Broken, worn or leaking sprinkler heads.	Replace them with the same kind of sprinkler heads. This will ensure the same rate of water application. Never try to mix sprinkler head brands on the same circuit.
Crooked or tilted sprinklers.	Straighten the sprinklers to their upright positions.
Sunken sprinkler or grass growing around the heads.	Raise the sprinkler by adding a "riser" or install a taller pop-up head; or trim the grass around the head so it doesn't interfere with water distribution.
Poor overlapping spray pattern.	Check the spray pattern of the sprinklers. Each sprinkler must throw water to the adjacent sprinklers

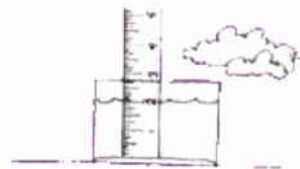
Turf Tip #2 Get to Know Your Grass

<p>Kentucky Bluegrass forms a dense, tightly-knit turf that withstands wear and has the ability to mend when damaged. The grass blades are narrow and dark green.</p>	<p>Tall Fescue is a grass with wide, coarse blades. The Turf-type Improved Tall Fescue is more desirable because it grows lower, denser, is deep rooted and has finer grass blades</p>	<p>Perennial Rye is a grass with a medium to fine texture. It is fast germinating and because of tough veins in the leaf blades, it often has a ragged appearance when mowed. It is often used in a seed mix.</p>
		

Turf Tip #3 Take the ET Test

You are now ready to take the ET test. This will determine how long and how often to water your lawn. First, you will need these items:

- 10 or more straight-sided cups or cans (We recommend coffee cups or soup cans, at least 4" to 6" deep, all with the same diameter)
- A pencil
- A ruler
- A calculator



Now, just follow these simple steps to take the ET test:

Step One: On a calm day (early morning is best), distribute the cans randomly around your front yard.

Step Two: Run the sprinklers for 15 minutes. If the water begins to puddle or run off the lawn before the 15 minutes are up, write the number of minutes the sprinkler ran before runoff occurred. If runoff occurs wait for an hour, then turn the sprinklers back on long enough to complete the 15 minutes. Record the length of time the sprinklers ran here: ____ This is the longest you can run this set of sprinklers at a time, as we'll explain on Page 9.

Pause for a moment. Note the amount of water in the cans. There should be about the same amount in each can. You may need to make some minor sprinkler adjustments, such as turning the screws in the center of a nozzle to restrict or increase the water spray. However, if the water levels are more than 50 percent different (for example, one can contains 3/4" water and another 1/4"), you might need some major repairs. If so, call in a professional.

Often an area is irrigated by a second station, and the spray pattern is needed to complete the coverage for the area. In this case, randomly place the cans over the area covered by both stations and run the water for 15 minutes for each station. Pick up the cans and continue to Step Three.

Step Three: For easier figuring, pour the water into one of the cans used in the test. it may take more than one can to collect all the water.

Step Four: Next, place these cans of water on a level surface. With your ruler, measure the depth of water in each can and record the amount. Using your calculator, add the figures and divide by the number of cans used in the test. This will determine the average inches of water your sprinkler system applied. Record the average water depth here: ____

Step Five: To determine how much and how often you need to water, check the ET charts on pages 10 and 12. For example, you have done the cup test on your lawn and your average water depth is .5 (1/2"). Look on Chart 1, (twice a week watering) and under average can depth find .5"(from Step Four). In the column directly under it, go down to where the cross column reads June. It tells you to water your lawn 22 minutes on each watering day in June. Record this number here for future reference: ____

Check the ET chart each month to make sure you're using the right amount of water on your lawn. Adjust your clock accordingly. If it rains during the week and the amount of moisture adds up to the amount you would be applying on your next watering day, skip watering that day and resume on the next watering day.

Step Six: Repeat Steps One through Five for the side yards and back yard to get the average water depths for those areas. These water depths may be different than your front yard.

Record these numbers for future reference:

Side Yards: _____ Back Yard: _____

If puddling or runoff occurs before the 15 minutes used in the test, break up your watering time. For example, if your required watering time is 12 minutes but runoff begins after 6 minutes, water twice-6 minutes each cycle-one or two hours apart. Allow the water to soak in. Remember: **Water and Wait!**

If you water with a hose you still need to do a can test. Place the cans in the front yard and turn on the water for 15 minutes using the sprinkler you normally use for watering the lawn. If you have more than one setting to cover the front yard, place the sprinkler at each spot and run the water for 15 minutes for each location. Take the average from the ten cans and use the charts.

LAWN WATERING CHART 1 FOR NORTHERN NEVADA GRASSES

	AVERAGE WATER DEPTH FROM CAN TEST</DIV< TD>						
TENTHS OF INCH	.25"	.31"	.375"	.44"	.50"	.56"	.625"
FRACTION OF INCH	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
AMOUNT NEEDED PER WEEK	MINUTES TO WATER EACH WATERING DAY (twice a week watering)</DIV< TD>						
April .98"/week	29	23	20	17	15	13	12
May 1.18"/week	35	28	24	20	18	16	14
June 1.45"/week	43	35	29	25	22	20	17
July 1.60"/week	47	38	32	28	24	22	19
August 1.50"/week	46	37	30	26	23	20	18
September 1.12"/week	34	27	23	20	17	15	13
October .96"/week	29	23	19	17	15	13	12

Minutes based on a 15 minute cup test and ET data. If runoff occurs, water more frequently. For example: Water twice for 10 minutes each instead of once for 20 minutes, allowing water to soak in between cycles.

LAWN WATERING CHART 1 FOR CARSON CITY GRASSES

	AVERAGE WATER DEPTH FROM CAN TEST						
TENTHS OF INCH	.25"	.31"	.375"	.44"	.50"	.56"	.625"
FRACTION OF INCH	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
AMOUNT NEEDED PER WEEK	MINUTES TO WATER EACH WATERING DAY (thrice (3x) a week watering)						
April .98"/week	15	12	10	9	8	7	6
May 1.18"/week	18	14	12	10	9	8	7
June 1.45"/week	22	18	15	13	11	10	9
July 1.60"/week	24	19	16	14	12	11	10
August 1.50"/week	23	19	15	13	12	10	9
September 1.12"/week	17	14	12	10	9	8	7
October .96"/week	15	12	10	9	8	7	8

Minutes based on a 15 minute cup test and ET data. If runoff occurs, water more frequently. For example: Water twice for 10 minutes each instead of once for 20 minutes, allowing water to soak in between cycles.

Turf Tip #4 Water Early in the Morning

During the summer, water early in the morning when it's calm. Here are some reasons why:

- Less water is lost from evaporation
- Spray drift caused by wind is reduced
- Water soaks deep into the soil and is there when it's most needed- in the heat of the day

Turf Tip #5 Shape Up Your Turf

Problem #1 Thatch: If you're still experiencing water runoff or if dry spots won't go away, your lawn may have developed too much thatch. To check for thatch, take a sample of grass and soil 2" wide by 2" deep. If the spongy area between the grass and soil is more than 1/2" thick, you probably have a thatch problem. This may be due to overwatering or overfertilizing.

- To remove the thatch, use a power rake or hire a professional.
- Before dethatching, mark your sprinkler heads to avoid damaging them. Recheck your irrigation system after power raking to be sure it's still okay.

•

Problem #2 Compacted Soil: Your lawn may have developed compacted soil. This soil will not allow water and nutrients to soak down to the roots. Aeration (or coring) in the spring and fall is a way to open up compacted soil and reduce water runoff. It also helps to reduce thatch buildup.

Coring is done by inserting hollow tubes-1/2" wide by 4" deep and spaced 4" to 6" apart-into the ground. Cores of soil come out of the tubes to allow water, air and fertilizer to penetrate deep into the soil.

Leave these cores on the grass-your mower will break them up and they will filter back into the soil.

Purchase a hand soil aerator (about \$20) to do the aerating or rent a coring machine from a local garden outlet. To make the job easier, have it done professionally.

Aerating and dethatching:

- Improve water penetration
- Reduce water runoff on slopes
- Increase fertilizer effectiveness
- Lessen thatch accumulation
- Help grass root growth
- Relieve compaction

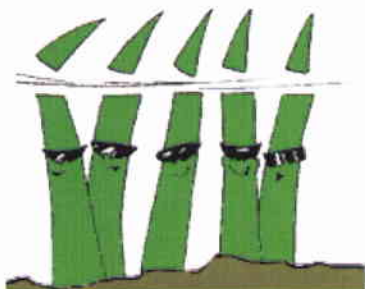
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Turf Tip #6 Fertilize Less to Save Water

You still need to fertilize your lawn but do it in the spring and autumn when it's cool to promote root growth not top growth. Reduce or even eliminate fertilization during the summer. By fertilizing less, you'll slow down grass growth and use less water.

Select a balanced, slow-release lawn fertilizer with iron and especially with potassium to build in heat and cold resistance, stimulate root growth and increase disease protection.

Follow the instructions on the package and apply only the amount needed. Water immediately after applying the fertilizer to promote quick absorption. However, avoid overwatering to prevent runoff and pollution of our water supply.



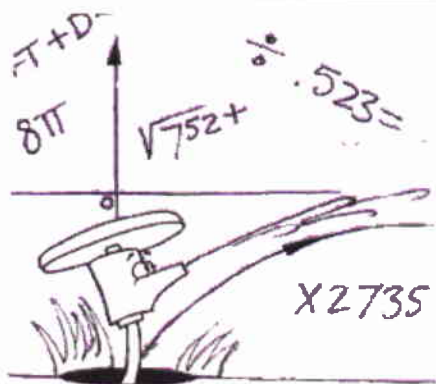
Turf Tip #7 Mow Sharp and by the Chart

Keep your mower blades sharp. Mowing with dull blades or when the grass is wet can result in a ragged-looking lawn and stressed turf.

Mowing heights affect water conservation. Mow your lawn according to the chart below. Follow the recommended height to use less water while still keeping a healthy and attractive lawn. Mow when the grass has grown one-third taller, and leave the clippings on the lawn.

Mowing Heights For Northern Nevada Grasses (In Inches)

Grass Type	Preferred Cut
Grass Type	2" - 2 1/2"
Bluegrass	2 1/2"-3"
Tall Fescue	1 1/2"-2"
Improved Fescue	1/2"
Perennial Rye;	2" - 2 1/2"



Finally, Keep an Eye on Your Lawn

This manual will help you to monitor your lawn's health with more precision. By keeping an eye on your lawn and your sprinklers, you will get a feel for the many components that go into good lawn care. ET helps you water your lawn by its need, using your sprinkler clock, calendar and scientific information to apply water right and life!

If you have any questions about the ET method or lawn care in general, just ask us. We'll be happy to help. Call: University of Nevada Cooperative Extension 784-4848 (Washoe County) or call The Water Conservation Hotline 689-5005 (Westpac)

The Scientific Facts

If you're wondering how we came up with the figures on the ET charts, they're based on a University of Nevada Cooperative Extension research project- the first study of its kind in northern Nevada.

University scientists use a weather station in the Truckee Meadows to collect the data. The station keeps track of temperature, relative humidity, solar radiation and wind speed.

The information is then fed into a computer. The results? Accurate figures that help you know just how much water to apply to your lawn at any given time during the year.

These figures are provided as a public service to homeowners and commercial turf managers to help everyone water more efficiently.

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Notes for customers without lawn sprinkler systems:

If you use a hose with a sprinkler on the end to water your lawn, the following guidelines apply (see “The All Seeing, All Knowing Lawn Care Guide”).

Use a tuna can as described in the “Take the ET Test” section of the Guide to measure the water applied by your hose sprinkler. Position the can about half way between the sprinkler and the edge of the spray pattern.

After measuring the water height in the can, see the “Lawn Watering Chart for Northern Nevada Grasses” to find out how many minutes to water each day (the chart assumes you water two days each week).

Each time you move your sprinkler, water for the number of minutes shown on the chart. It is strongly suggested that you use an automatic timer for watering with your hose. These timers attach to the outside faucet, and shut the flow of water off when the pre-set time is reached. Remember that if the water starts to puddle or run off when watering, break your watering time into two or more sessions to allow it to soak in completely.

Please read the entire Guide for more good lawn care tips.

Eureka County

Lawn Evapotranspiration (ET) Rates and Seasonal Distribution

Evapotranspiration (ET) is the loss of water from the soil, both by evaporation and by transpiration from plants growing in the soil (plants consuming water.)

Use the following information in conjunction with the Lawn Care Manual to determine how much water your lawn needs each month. Note that in Eureka County's changeable climate, the amount of water that the lawn needs varies considerably. You can save water in the spring and fall by not watering as much as you need to during the peak of summer.

Also note that by not watering in the heat of the day or during times of wind, you may conserve water and control your water bill.

Lawn watering requirements vary by month as follows.

April = 1.92 inches

May = 4.16

June = 5.44

July = 7.36

Aug = 6.08

Sept = 3.52

Oct = 1.6

Per the local agmet weather station, lawn e-t in Eureka is 38 inches per year.

<http://www.usbr.gov/pn/agrimet/ETtotals.html>

Subtract 6 inches of effective precipitation from that total = 32 inches of irrigation required. On a per month bases you will need the irrigation amounts shown above.

Estimates provided by Steve Walker, Walker and Associates, March 2008

Tips for the Home Gardener for Efficient Water Use

Water infrequently, deeply, and thoroughly. This will encourage rooting and greater tolerance to dry spells. Plants send out extra roots in dry conditions to seek water. Plants often bloom more profusely when stressed, as the natural instinct to reproduce creates more flowers.

Water responsibly, using correct watering techniques. Water early in the day, especially as the weather warms, to reduce evaporation loss. Water less often for longer lengths of time to encourage deep root growth. Be sure your irrigation system is in proper working condition. If drip irrigation won't work for you, try a hand held hose rather than a sprinkler.

Properly condition your soil. Water does not easily penetrate clay soils and water passes too quickly beyond the root zone of plants in sandy soil. Adding organic matter to clay and sandy soils will increase the penetrability of clay soils and the water holding capacity of sandy soils. Claybreaker and Ultra-light soil amendments are suggested for proper conditioning.

Mulch soil surface. Mulching cuts down on water loss due to evaporation. A two-inch layer of mulch or compost is recommended. Apply mulches to shrubs, trees, annuals, vegetable gardens, and even containers.

Shelter container plants. To conserve water, move containers to areas with partial shade to keep them from drying quickly in hot windy areas.

Install a drip or other water conserving irrigation system. Slow drip and deep root watering systems can save up to 60% of all water used in garden care. Professionally installed and maintained irrigation systems will further help conserve water.

Discourage water competition from weeds. Keep weeds pulled and reduce the likelihood of them returning by mulching. Consider using landscape fabric between the soil and your mulch to further reduce weeds.

Water Conservation and Washing Vehicles

Water conservation begins at home. Taking a few, simple steps when washing your boat or vehicle (including automobiles, trucks, motorcycles, and trailers) can help to conserve water and protect the quality of nearby water bodies.

Wash vehicles on grass, not on pavement. Wash your vehicle over an unpaved area, such as an area covered with grass or gravel. Washing over an unpaved surface will allow the soapy water to soak into the ground, be filtered, and eventually recharge the groundwater. If you have your own well, you should wash your vehicle at least 100 feet from the well head. If you wash the vehicle on a paved surface, the runoff flows into a storm drain, and the water and contaminants are discharged to the nearest lake or stream.

Wash vehicles using a bucket with soapy water. Soap and water usually work well. If you need a special cleaning product for vehicles, read the label carefully and be sure to use a non-toxic, biodegradable detergent. Do not use a product that says Poison, Harmful, or Danger. Be sure to turn the running water off while you are washing a vehicle.

Rinse vehicles with a hose equipped with an automatic shutoff nozzle. A standard garden hose uses about 10 gallons per minute. This means you use 100 gallons of water with only a 10-minute car wash. When you use an automatic shutoff nozzle on your hose, water does not flow continuously while you wash your vehicle, saving as much as 70 gallons per wash.

Using a power washer can conserve even more water; power washers use, on average, about 2 to 5 gallons per minute, with a potential savings of up to 80 gallons over using a standard house without an automatic shutoff nozzle.

Consider going to a commercial car wash. If you cannot wash your vehicle in an area that drains to the lawn or a gravel area, take it to a commercial spray booth or car wash. A properly designed car wash is connected to a sanitary sewer that carries the dirty water to a wastewater treatment plant.

There are three types of commercial car washes: self-serve car washes, in-bay automatic car washes, and conveyor car washes. The following table provides water use information by car wash type. The data represents the total water used, and does not take into account whether or not a car wash recycles its water.

Average Water Consumption (gallons per vehicle) by Car Wash Type			
Car Washing Type	International Car Wash Association¹	Mid-Atlantic Carwash Association²	WaterWiser³
Home wash (with automatic shut-off nozzle)	--	--	30
Home wash ⁴ (without automatic shutoff nozzle)	--	--	100
Self Serve	15	15	--
In-Bay	50-60	35	65-100
Conveyor	66-85	60	30-50

¹ Brown, Chris. 2002. "Water Use in the Professional Car Wash Industry & Car Wash Association." p. 47.

² Mid-Atlantic Carwash Association, Inc. Information provided to the Maryland Water Conservation Advisory Committee. June 2000.

³ WaterWiser [http://www.waterwiser.org/watch/wiser_watch.cfm?ArticleID=96]. February 2003.

⁴ Assumes a 15 minute car wash with flow of 10 gpm.

Many newer conveyor car washes and some newer in-bay car washes clean and recycle water in their car wash bays. Car washes that recycle their water use much less water than standard car washes. The quantity of water recycled varies from 10 percent to 80 percent of the water used. Check to ensure that the car wash you choose recycles its water.